Perform Valve Leak Repair During Pipeline Replacement

Technology/Practice Overview

Description

Operating pipelines remain in service for long periods of time, during which they experience internal corrosion and significant pressure, thermal, and mechanical stresses. Corrosion debris will often accumulate in valve seats, preventing tight closure and causing gas leakage when the valves are closed to isolate pipeline sections for repair. Pipeline replacement or repair projects afford rare opportunities to inspect and maintain both internal and external components on pipeline valves since repairing valves would typically require the pipeline to be taken off-line.

To cost effectively reduce gas losses, one Partner reports inspecting and repairing leaking components in the vicinity of ongoing pipeline repair or replacement projects. These inspections can be carried out efficiently using infrared cameras, acoustic leak detectors, and/or other leak detection devices.

Operating Requirements

In order to perform leak repairs, clean valve seats, replace valve-stem packing, replace couplings, or remove and replace an entire valve, it is necessary to isolate it, which requires other mainline valves to be closed. Balloon seals may need to be inserted to isolate a valve for maintenance.

Applicability

This practice applies to all pipeline repair and replacement projects.

Methane Emissions

The amount of avoided emissions is based on the typical leak rates through

- ☐ Compressors/Engines
- ☐ Dehydrators
- ☐ Directed Inspection & Maintenance
- ■ Pipelines
- ☐ Pneumatics/Controls
- ☐ Tanks
- ■ Valves
- ☐ Wells
- ☐ Other

Applicable Sector(s)

- ☐ Production
- ☐ Processing
- ■ Transmission
- ■ Distribution

Other Related Documents:

Test and Repair Pressure Safety Valves, PRO No. 602

Directed Inspection and Maintenance at Compressor Stations, Lessons Learned

Directed Inspection and Maintenance at Gate Stations and Surface Facilities, Lessons Learned

Directed Inspection and Maintenance at Gas Processing Plants and Booster Stations, Lessons Learned

Economic and Environmental Benefits

Methane Savings

Estimated annual methane emission reductions	*2,500 Mcf per ten pipeline gate valves*

Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
$7.00/Mcf	2,500 Mcf	$18,600	$3,000	$200	2 Months
$5.00/Mcf	2,500 Mcf	$13,300	$3,000	$200	3 Months
$3.00/Mcf	2,500 Mcf	$8,000	$3,000	$200	5 Months

** Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.*

Additional Benefits

- Safety of pipeline system and operators
- Timely repair can avoid future system upsets and unplanned shut-downs

Perform Leak Repair During Pipeline Replacement (Cont'd)

gate valves (130 Mcf per year) and gate valve stem packing (120 Mcf per year) reported in EPA's *Lessons Learned for Directed Inspection and Maintenance at Gate Stations and Surface Facilities*. The Partner reported methane emissions reductions of 1,700 Mcf by repairing 12 leaking couplings and 6 valves.

Economic Analysis

Basis for Costs and Emissions Savings

The methane savings of 2,500 Mcf per year were associated with repairing ten leaking pipeline gate valves per year, including replacing valve stem packing.

The economic analysis assumes equipment and labor costs of $300 per valve repair. The incremental operating cost is based on 2 operators spending 4 hours per person (at $25 per hour) to test two gate valves for leakage, and repair one. The time for traveling to the pipeline is assumed part of the pipeline project.

Discussion

This practice generally has a favorable payback. The value of gas saved by repairing the valve is incidental to safety issues associated with leaking pipeline valves. In addition, timely repair of valves can avoid system upsets and unplanned shut-downs.

Methane Content of Natural Gas

The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.

Production	79 %
Processing	87 %
Transmission and Distribution	94 %

EPA provides the suggested methane emissions estimating methods contained in this document as a tool to develop basic methane emissions estimates only. As regulatory reporting demands a higher-level of accuracy, the methane emission estimating methods and terminology contained in this document may not conform to the Greenhouse Gas Reporting Rule, 40 CFR Part 98, Subpart W methods or those in other EPA regulations.